



WASHINGTON'S AGRICULTURAL VEGETABLE CHEMICAL USAGE, 2006

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CHEMICAL USAGE OVERVIEW

Vegetable chemical usage data for selected Washington vegetable crops are presented in the accompanying releases. These data are the results of the Vegetable Chemical Usage Survey that was conducted in the fall of 2006. This survey was designed to collect data on pesticides applied to selected vegetable crops in 2006. A sampling of producers in major vegetable growing states, across the United States, was chosen to establish the estimation base. The probability nature of the survey allowed for estimates that are representative of chemical use on all targeted vegetables in each of the participating states. Survey results include estimates of the percent of area treated, number of applications, rates per application, rates per crop year, and total pounds of chemical applied. Data are summarized for the active ingredients of pesticides and other chemicals applied. Pesticide data were collected for specific formulations of trade name products and then converted to active ingredients. Therefore, the estimates associated with a particular active ingredient may represent applications of

several trade name products. Pesticide application rates also reflect partial coverage applications as a result of band, spot, and alternate row spraying techniques. This survey excludes any chemical treatments applied to the vegetables after harvest. Data on fertilizer applications were collected during the 2006 Vegetable Chemical Usage Survey, but were not collected in 2004.

Targeted crops in Washington included asparagus, processing carrots, processing sweet corn, bulb onions, processing green peas, and strawberries. Chemical use releases for all six crops surveyed in Washington, and crops surveyed in other states, are available upon request or via the internet. Thanks are given to the many Washington vegetable producers and contractors who provided the information summarized in these reports. Detailed reports, such as these, would not be possible without their voluntary cooperation.

Terms and Definitions

Active ingredient is the specific chemical which kills or controls the target pest(s). Usage data are reported by pesticide product and are converted to an amount of active ingredient. A single method of conversion has been chosen for active ingredients having more than one way of being converted. For example in this report, copper compounds are expressed in their metallic copper equivalent, and others such as 2,4-D and glyphosate are expressed in their acid equivalent form.

Agricultural chemicals refer to the active ingredients in fertilizers and pesticides. **Pesticides** include any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, and any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant. Pests targeted by pesticides include weeds, insects, fungi, and other forms of life.

Herbicides--weeds, insecticides--insects, fungicides--fungi, and other chemicals--other forms of life, make up the four classes of pesticides presented in this report. Miticides and nematocides are included as insecticides, while soil fumigants, growth regulators, defoliants, and desiccants are included as other chemicals. This report excludes pesticides used for seed treatments, for spot treatment, and for postharvest applications to the commodity.

Crop year refers to the period immediately following harvest for the previous crop through harvest of the current crop. **Application rates** refer to the average number of pounds of a fertilizer primary nutrient or pesticide active ingredient applied to an acre of land in one application. The rate reflects the effect of band, spot, or alternate row middle spraying. **Rate per crop year** is the average number of pounds applied of an ingredient to one acre of land over the entire crop year, counting multiple applications. **Number of applications** is the average number of times a treated acre receives a specific agricultural chemical. **Area applied** represents the percentage of crop acres receiving one or more applications of a specific primary nutrient or active ingredient. **Avoidance** may be practiced when pest populations exist in a field or site but the impact of the pest on the crop can be avoided through some cultural practice, such as choosing cultivars with genetic resistance to pests or using trap crops. This report does not contain **acre treatments**. However, acre treatments can be calculated by multiplying the acres planted by the percent of area applied and the average number of applications.

Trade name is the trademark name given to a specific formulation of a pesticide product. A formulation contains a specific concentration of the active ingredient, carrier materials, and other ingredients such as emulsifiers and wetting agents. Some formulations as in the case of pre-mixes, can contain more than one active ingredient. The **common name** is an officially recognized name for an active ingredient. This report shows active ingredient by common name.

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TRADE NAMES, COMMON NAMES, AND CLASSES

The following is a list showing common name, associated class, and trade name of active ingredients in this publication. The classes are herbicides (H), insecticides (I), fungicides (F), and other chemicals (O). This list is provided as an aid in reviewing pesticide data. Pre-mixes are not cataloged. The list is not complete for all pesticides used on the vegetable crops surveyed and NASS does not mean to promote use of any specific trade name.

Class	Common Name	Trade Name
H	2, 4-D	Envy 2,4-D
H	2,4-D, dimethylamine salt	2,4-D Amine 4, Formula 40, Hi-Dep, Weedar 64
I	Abamectin	Abba, Agri-Mek 0.15EC, Epi-Mek 0.15 EC, Quali-Pro Abamectin 0.15 EC, Zephyr 0.15 EC
H	Alachlor	Alachlor 4 EC, Arena (4EC), Bullet, Intro (4E), Lariat (4F), Lasso, Micro-Tech, Partner WDG, Saddle
H	Atrazine	Aatrex 4L, Aatrex Nine-O (WP), Atrazine 4L, Atrazine 5L, Atrazine 90DF, Bicep II Magnum
I	Azadirachtin	Agroneem, Aza-Direct, Bollwhip 4.5, Ecozin 3% EC, Margosan-O, Neemix 4.5, Ornazin 3% EC
F	Azoxystrobin	About, Amistar, Quadris, Quadris Opti, Quilt
H	Bensulide	Prefar 4E, Prefar 6-E
H	Bentazon	Basagran, Basagran (For Turf & Ornamental), Laddok, Laddok S-12
I	Bifenazate	Acramite 50WS
I	Bifenthrin	Bifenthrin 2EC, Bifenture EC, Brigade WSB 10WP, Capture 2EC, Discipline 2EC, Empower 2
F	Boscalid	Endura (70WG), Pristine
H	Bromoxynil	Buctril (2EC), Moxy 2E
H	Bromoxynil heptanoate	Buctril 4EC
H	Bromoxynil octanoic acid ester	Bromox 2E, Bromox/MCPA 2-2, Brox 2EC, Brox-M, Buctril 4EC
F	Captan	Captan 10 Dust, Captan 4L, Captan 50W, Captan 7.5 Dust, Captan 80 WDG, Captan 80-WP, Captec 4L
I	Carbaryl	Carbaryl 4L, Carbaryl 5% Bait, Carbaryl 80S, Ortho Liquid Sevin, Sevin 10%, Sevin 20% Bait
H	Carfentrazone-ethyl	Aim (40% WDG), Aim EC, Aim EW, Shark
O	Chloropicrin	Chloropicrin 100, InLine, MBC 67-33, MBC-33, Methyl Bromide 45% & Chloropicrin 55%
F	Chlorothalonil	Bravo 500, Bravo 720, Bravo S (EC), Bravo Ultrex, Bravo W-75, Bravo Weather Stik, Bravo ZN
I	Chlorpyrifos	Chlorpyrifos 4E AG, Dursban ¹ 2G, Govern 4E, Lorsban 15G, Lorsban 4E, Lorsban 50W
H	Clethodim	Arrow 2EC, Envoy, Intensity, Prism, Section 2 EC, Select 2 EC, Volunteer
H	Clomazone	Command 3 ME, Command 4EC, Strategy
H	Clopyralid	Hornet, Stinger (3EC)
F	Copper ammonium complex	Copper-Count-N
F	Copper hydroxide	Blue Shield 3L, Blue Shield 50 WP, Blue Shield WP, Champ Dry Prill, Champ Flowable
I	Cypermethrin	Ammo 2.5 EC, Ammo WSB (39%), Battery 2.5 EC
F	Cyprodinil	Switch 62.5 WG
H	DCPA	Dacthal Flowable, Dacthal W-75
I	Diazinon	D-264 EC500, D-z-n Diazinon 50W, D-z-n Diazinon AG500 (4E), Diazinon 14G, Diazinon 4 Spray
O	Dichloropropene	InLine, Pic-Clor 60, Telone C-17, Telone C-35, Telone EC, Telone II
F	Dicloran	Botran 5F, Botran 6 Dust, Botran 75W, Diclor, Sclerban 75 WDG
H	Dimethenamid	Frontier 6.0, Guardsman
H	Dimethenamid-P	G-Max Lite, Guardsman Max, Outlook
I	Dimethoate	Cygon 2-E, Cymate 267, De-Fend E-267, Dimate 4EC, Dimethoate 2.67 EC, Dimethoate 25 WP
F	Dimethomorph	Acrobat 50WP, Acrobat MZ, Forum
I	Disulfoton	Di-Syston 15% G, Di-Syston 8, Terraclor Super X w/ Di-Syston
H	Diuron	Direx 4L, Direx 80DF, Diuron 4L, Diuron 80DF, Diuron 80W, Karmex DF, Karmex XP
H	EPTC	Eptam 20-G, Eptam 7-E, Eptek 7EC, Eradicane 25G, Eradicane 6.7E, Eradicane Extra (6EC)
I	Endosulfan	Endocide 3EC, Endosulfan 3EC, Endosulfan 50W, Phaser (3EC), Phaser 3EC, Thiodan 2 C.O. EC
I	Esfenvalerate	Asana, Asana XL, Ortho Bug-B-Gon
I	Ethoprop	Mocap 10G, Mocap 15G, Mocap EC
F	Fenamidone	Reason 500 SC
F	Fenhexamid	Captevate 68 WDG, Elevate 50 WDG
H	Fluazifop-P-butyl	Fusilade 2000 (1EC), Fusilade DX
F	Fludioxonil	Maxim 4FS, Switch 62.5WG
I	Formetanate hydrochloride	Carzol SP
F	Fosetyl-al	Aliette WDG (For Crop Protection)
H	Glyphosate isopropylamine salt	Buccaneer, Buccaneer Plus, ClearOut 41 Plus, Cornerstone, Cornerstone Plus, Credit, Durango
H	Glyphosate ammonium salt	Credit Duo Extra, Roundup Ultra Dry
H	Halosulfuron	Permit, Sandea
O	Harpin protein	Messenger STS
I	Hexythiazox	Savey 50 DF, Savey 50 WP
O	Hydrogen peroxide (dioxide)	Oxidate
H	Imazamox	Raptor
H	Imazethapyr	Pursuit DG, Pursuit Plus EC

TRADE NAMES, COMMON NAMES, AND CLASSES (continued)

CLASS	COMMON NAME	TRADE NAME
I	Imidacloprid	Admire 2 Flowable, Admire Pro, Merit 75 WP, Provado 1.6 Flowable, Widow
F	Iprodione	Iprodione 4L, Rovral 4 Flowable, Rovral Fungicide (50WP)
O	L-Glutamic acid	Auxigro
I	Lambda-cyhalothrin	Chemsico Insect Granule LH, Chemsico Insecticide Concentrate 5L, Demand CS
H	Linuron	Lorox DF
H	MCPA 2-ethylhexyl ester	Bromox/MCPA 2-2, Brox-M, Solve MCPA Ester
H	MCPA dimethylamine salt	MCP Amine 4, MCPA Amine (3.7SC), Rhomene MCPA Amine
H	MCPA sodium salt	Chiptox MCPA Sodium (2L)
H	MCPB	Thistrol (2L)
I	Malathion	Malathion 25 WP, Malathion 5 Dust, Malathion 5 EC (56%), Malathion 5 EC (57%)
O	Maleic hydrazide	Maleic Hydrazide 1.5, Royal MH-30, Royal MH-30 SG, Royal MH-30 Xtra, Sprout Stop
F	Mancozeb	Acrobat MZ, Cuprofix MZ Disperss, Dithane 75DF Rainshield (For T & O), Mankocide
F	Maneb	Amazin (80WP), Dithane M-22 Special (80WP), Maneb 4 Flowable, Maneb 75DF
F	Mefenoxam	Ridomil Gold Bravo L (7008 & 7286), Ridomil Gold EC, Ridomil Gold GR
H	Mesotrione	Callisto, Camix, Lexar, Lumax
F	Metalaxyl	Ridomil 2E, Ridomil Copper 70W, Ridomil PC 11G, Ridomil/Bravo 81W
O	Metaldehyde	Deadline Bullets, Deadline M-Ps, Metaldehyde 3.5G, OR-CAL Snail & Slug Bait
O	Metam-sodium	Metam 426 (For All Crops), Metam Sodium (32.7%) (For All Crops), Sectagon 42
H	Methanone	Impact
I	Methomyl	Lannate L (1.8 lbs.), Lannate LV (2.4 lbs.), Lannate SP, Nudrin 1.8
I	Methyl bromide	MBC 67-33, MBC-33, Methyl Bromide 45% & Chloropicrin 55%, Methyl Bromide 98%
I	Methyl parathion	Declare, Methyl Parathion 4EC, Parathion-Methyl Parathion 6-3EC C 2002, Penncap-M
H	Metolachlor	Dual 25G, Dual 8E, Me-Too-Lachlor, Parallel, Stalwart C
H	Metribuzin	Axiom DF, Lexone DF, Metri DF, Metribuzin 75DF, Sencor 4, Sencor DF (75%)
F	Myclobutanil	Nova 40W, Rally 40W, Rally 40WSP
I	Naled	Dibrom 4 Dust, Dibrom 8 Emulsive, Dibrom 8 Miscible, Trumpet EC
H	Napropamide	Devrinol 2-E, Devrinol 5-G, Devrinol 50-DF, Devrinol 50-DF Ornamental
H	Nicosulfuron	Accent Herbicide, Celebrity Plus
I	Oxamyl	Vydate L
I	Oxydemeton-methyl	Metasystox-R (2EC)
H	Oxyfluorfen	Goal 1.6E, Goal 2XL, Goaltender, OxiFlo 2EC, Oxyfluorfen 2 Herbicide
H	Paraquat	Cyclone Concentrate, Gramoxone Extra, Gramoxone Inteon, Gramoxone Max
H	Pendimethalin	Acumen, Pendant 3.3 EC herbicide, Pendimax 3.3, Pendimethalin, Prowl (4EC)
I	Permethrin	Ambush, Ambush 0.5% Bait, Ambush 25W, Arctic 3.2 EC, Eight Insect Control
F	Phosphorous acid	Agri-Fos Systemic Fungicide, Fosphite Fungicide, Phostrol, Prophyt, Topaz
F	Potassium bicarbonate	Armicarb 100, Kaligreen (WP), MilStop Broad Spectrum Foliar Fungicide
F	Propiconazole	Bumper 41.8 EC, PropiMax EC, Quilt, Tilt
F	Pyraclostrobin	Cabrio EG, Headline, Pristine
F	Pyrimethanil	SCALA SC
H	Quizalofop-P-ethyl	Assure II
H	S-Metolachlor	Bicep II Magnum, Bicep Lite II Magnum, Brawl, Brawl II, Camix, Cinch, Cinch ATZ
H	Sethoxydim	BASF Poast Herbicide, Conclude G (Poast), Poast, Poast HC, Poast Micro Flo, Poast Plus
H	Simazine	Princep 4G, Princep Caliber 90, Princep Liquid (For Turf & Ornamental), Sim-Trol 4L
I	Spinosad	Conserve Professional Fire Ant Bait, Entrust, GF-120 NF Naturalyte Fruit Fly Bait
H	Sulfentrazone	Spartan (75%), Spartan 4F
F	Sulfur	Ben-Sul 85, Bravo S (EC), Bt Sulfur 15-50 Dust, C-O-C-S 15 Sulfur 25, Kumulus DF
F	Tebuconazole	Folicur 3.6 F
I	Tefluthrin	Force 3G
H	Terbacil	Sinbar (80WP)
I	Thiamethoxam	Actara, Centric, Platinum
F	Thiophanate-methyl	T-Methyl 70W WSB, Topsin 4.5FL, Topsin M 70WP, Topsin M 85 WDG
F	Thiram	Thiram 65WP, Thiram 75WP
F	Triflumizole	Procure 480SC, Procure 50WS, Procure 50WS (Use 7242)
H	Trifluralin	Preen, Treflan 4L, Treflan 5 (EC), Treflan E.C., Treflan HFP, Treflan M.T.F., Trust 4EC
F	Vinclozolin	Ronilan EG
I	Zeta-cypermethrin	Fury 1.5 EC, Mustang, Mustang Max

All Vegetables: Pest Management Practices, Washington and Program States, 2006

Practices	WA	Program States	WA	Program States
	Percent of Acres Receiving		Percent of Farms Utilizing	
Prevention Practices:				
No-till/minimum till used to manage pests	43	28	27	25
Remove or plow down crop residue	61	71	61	63
Clean implements after fieldwork	80	68	67	55
Field cultivated for weed control	85	76	70	70
Field edges/etc. chopped, mowed/etc.	78	72	67	59
Water management practices	62	52	42	42
Avoidance Practices:				
Adjust planting/harvesting dates	25	26	15	18
Rotate crops to control pests	86	81	60	79
Planting locations planned to avoid pests	13	37	22	35
Grow trap crop to control insects	7	8	5	5
Crop variety chosen for pest resistance	47	43	30	37
Monitoring Practices:				
Scouting by general observation	73	87	60	72
Deliberate scouting activities	22	10	37	23
Field was not scouted	5	3	4	5
Established scouting process/insect trap used	58	60	31	37
Scouting due to pest advisory warning	26	23	13	16
Scouting due to pest development model	31	25	15	17
Scouted for weeds	95	94	94	91
Scouting for weeds was done by:				
Operator, partner, or family member	43	40	65	73
An employee	15	9	4	3
Farm supply or chemical dealer	14	15	20	6
Indep. crop consultant or comm. scout	11	25	6	8
Other	18	10	4	10
Scouted for insects and mites	98	97	95	93
Scouting for insects/mites was done by:				
Operator, partner, or family member	39	31	59	65
An employee	11	9	5	3
Farm supply or chemical dealer	19	17	24	8
Indep. crop consultant or comm. scout	6	29	5	10
Other	24	14	7	14
Scouted for diseases	96	96	90	90
Scouting for diseases was done by:				
Operator, partner, or family member	40	31	59	66
An employee	9	8	3	3
Farm supply or chemical dealer	18	17	23	8
Indep. crop consultant or comm. scout	7	30	7	10
Other	26	14	8	14
Records kept to track pests	64	62	39	37
Field mapping of pest problem	21	35	15	17
Soil/plant tissue analysis to detect pests	59	45	30	16
Weather monitoring	78	78	62	59
Biological pest controls	25	15	12	7
Suppression Practices:				
Biological pesticides	16	28	7	10
Beneficial organisms	12	11	7	6
Scouting used to make decisions	35	53	25	35
Maintain ground cover or physical barriers	47	45	44	43
Adjusted planting methods	19	23	19	24
Alternate pesticides with different MOA	79	63	48	36